

Kayak Controller – Documentation

Overview

The **Kayak Controller** is a modular and physics-driven kayaking system for Unity. It supports multiple stroke types, dynamic buoyancy, drag, leaning visuals, water force application, and event-driven or physics-based paddle strikes.

Designed for **both realistic simulation** and **arcade-style gameplay**, the controller is fully customizable and integrates easily with third-party water and animation systems.

Key Features

- Forward, reverse, sweep, and draw paddle strokes
 - Animation-event or trigger-based paddle force
 - Optional integration with external buoyancy and drag plugins
 - Visual leaning and responsive glide system
 - Modular water surface interaction with wave simulation
 - Audio splash system and paddle-based sound variation
 - Works with first- or third-person camera setups
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Getting Started

Requirements:

- Unity 2022 or higher
- Rigidbody physics enabled on kayak object
- Tagged “Water” triggers or colliders for water interaction

Setup Steps:

1. Drag `KayakPlayer.prefab` into your scene
 2. Assign your custom `KCWaterSurface` reference (optional)
 3. Add colliders with the tag `Water` to your scene's water bodies
 4. Attach `PaddleController.cs` to both paddle GameObjects
 5. Assign the `KayakController` reference in the paddle scripts
 6. If using animations, link them to `CharacterAnimationEvent.cs`
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Controls

Input	Action
W / S	Paddle forward / backward
A / D	Sweep turn left / right
Q	Left draw stroke (sharp left)
E	Right draw stroke (sharp right)
Mouse X	Rotate camera (optional)

Core Components

KayakController.cs

Handles:

- Rigidbody movement
- Paddle force logic (draw, sweep, forward)
- Glide and drag calculations
- Optional external plugin overrides

- Visual tilt and stability torque
- Audio management and one-shot variation

New Additions:

- **ForceOn**: switch between **WaterTrigger** and **AnimationEvent**
 - **AddWaterForce()**: apply external current or wind forces
 - Buoyancy and drag toggles for plugin compatibility
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PaddleController.cs

- Detects paddle-water collision via trigger
 - Applies force unless using animation-based strikes
 - Smooths paddle velocity
 - Supports automatic strike via OnTriggerExit or custom timing
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CharacterAnimationEvent.cs

- Works with animation events to apply precise paddle forces
 - Plays right/left side splash sounds with stereo panning
 - Activates optional paddle particle systems (deformer visuals)
 - Smoothly interpolates paddle velocities for better force accuracy
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KCWaterSurface.cs

- Sine wave-based water simulation
 - Returns `SurfaceHeight` + `WaveFrequency` at runtime
 - Can be extended or replaced by other shaders/systems
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Inspector Parameters

General Force Settings:

Field	Purpose
<code>ForceOn</code>	Mode for applying force (<code>WaterTrigger</code> / <code>AnimationEvent</code>)
<code>useExternalPluginBuoyancyForces</code>	Disable built-in buoyancy
<code>useExternalPluginDragForces</code>	Disable built-in drag

Water Force Settings:

Field	Purpose
<code>enableWaterForceOnKayak</code>	Apply global directional water force
<code>waterForceDirection</code>	Direction of force vector
<code>waterForceMultiplier</code>	Force strength

Physics & Visuals:

- `forwardStrokeForce`
 - `drawStrokeForce`
 - `turningTorque, steerTorqueMultiplier`
 - `dragInWater, angularDragInWater`
 - `maxVelocity, maxAngularVelocity`
 - `stability, leanAmount, leanSpeed`
 - `visualModel`: reference to the kayak mesh for tilting
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Customization Tips

- Use `PlayOneShot(clips)` to trigger audio variation on strokes
 - Call `EnableLeftPaddleDeformer()` / `DisableRightPaddleDeformer()` for splash FX
 - Replace `KCWaterSurface` with your own height and frequency simulator or your own water shader
 - Extend `ApplyPaddleForce()` to support multiplayer input or VR
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Troubleshooting

Issue	Solution
Kayak flips easily	Increase stability or reduce angular velocity
Paddle doesn't trigger stroke	Check tag on water object, make sure trigger colliders are used
Paddle not responsive	Ensure correct mode (ForceOn) and valid velocity logic
Sound missing	Assign clips and AudioSource in inspector

Support

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